Automation within an ADME laboratory

Compound management and storage

High-throughput *in vitro* ADME screening during the early stage of drug discovery positively impacts drug candidate selection with an enhanced probability of success in clinical trials.

Since most new drug candidates fail during preclinical and clinical development, and the late stage of drug development can be lengthy and costly, any means of identifying drug candidates with optimized ADME and PK properties in the discovery stage will have a positive impact on the drug discovery process overall.

The use of automation along each step of the process for *in vitro* screening is critical to maximizing both efficiency and reproducibility.

The initial step in the process to enable testing large sets of drug candidates (typically hundreds per week) is having a sophisticated compound management and storage system, where test compounds and be organized, stored and rapidly retrieved for testing.

These test compounds can then be taken to a Tecan with an automated decapper to simultaneously take off the screw caps. Following this step, compound samples are dispensed into 96-well plates for preparation to conduct a myriad of different *in vitro* ADME assays.

In our lab, we utilize a large storage unit that can hold up to 100,000 test compounds in bar-coded vials, where a rack of up to 96 compounds can be requested and retrieved within a few minutes.

High-throughput *in vitro* screening

Medicinal chemists who are actively synthesizing new chemical entities are looking to understand structure-activity relationships (SAR) against ADME properties such as:

- Drug solubility
- Permeability
- Metabolic stability
- Drug–drug interaction risk

Once the SAR is characterized, predictive *in silico* models may also be built to predict these properties for virtual molecules. The key to driving SAR analysis and optimizing ADME properties is having access to large data sets. In our *in vitro* screening lab, we have numerous Tecan robotic liquid handlers that provide us the flexibility to conduct a large number of *in vitro* assays in a 96-well plate format, ranging from cell-based permeability assays to metabolic stability and protein binding assays.

The routine use of Tecan liquid handlers reduces manual repetitive work, thus leading to less human error and expediting the generation of more reproducible *in vitro* data to drive chemistry strategy. Tecans are equipped with a variety of peripherals to add even more capabilities, which provides the flexible framework to allow us to easily create scripts to handle any type of assay.

As a result of utilizing compound management and *in vitro* assay automation solutions, our lab has been able to analyze up to 800,000 samples and screen up to 70,000 test compounds per year, which is required to support the drug discovery continuum that is always in pursuit of higher throughput and faster turnaround times.

The future of ADME automation

The industry can likely expect further demands for speed and turnaround times to drive faster decisions for compound progression as new automation technologies come to market. A trend toward smaller sample volumes will play a role. Technologies that enable one to deliver nanoliter instead of microliter sample volumes will also improve turnaround time as well as reduce waste of reagents. Lastly, software tools to automate data analysis could help eliminate the need to manually review raw data and expedite delivery of quality data to our clients.

This infographic has been created as part of a Bioanalysis Zone feature in association with Q² Solutions.